

WHAT IS CLAIMED IS:

1. A method of identifying a nucleic acid ligand to a lactamase, comprising:
 - (a) preparing a candidate mixture of nucleic acids;
 - (b) contacting the candidate mixture of nucleic acids with the lactamase enzyme, to form an candidate-enzyme mixture;
 - (c) increasing the stringency of the candidate-enzyme mixture to a predetermined salt concentration, wherein a target nucleic acids have an increased affinity to the lactamase relative to the candidate mixture at the predetermined salt concentration whereby the target nucleic acids may be partitioned from the remainder of the candidate mixture;
 - (d) partitioning the target-nucleic acids from the remainder of the candidate mixture; and
 - (e) amplifying the target nucleic acid to yield a pool of nucleic acids enriched with target nucleic acid sequences with relatively higher affinity and specificity for binding to the lactamase, whereby nucleic acid ligand of the lactamase may be identified.
2. The method of claim 1, further comprising:
 - (f) repeating steps (c), (d), and (e).
3. The method of claim 1, wherein the lactamase comprises a class B lactamase.
4. The method of claim 1, wherein the class B lactamase comprises a B anthracis metallo- β -lactamase
5. The method of claim 4, wherein the metallo-lactamase comprises a *B. cereus* 5/B/6 metallo- β -lactamase.
6. The method of claim 4, wherein the metallo-lactamase comprises a *B. cereus* 569/H/9 metallo- β -lactamase.

7. The method of claim 1, wherein the nucleic acid ligand comprises a single stranded nucleic acid.
8. The method of claim 7, wherein the single stranded nucleic acid comprises deoxyribonucleic acids.
9. The method of claim 1, wherein the salt concentration is in a range of about 10mM to about 50mM.
10. The method of claim 1, wherein the candidate mixture of nucleic acids is in a range of about 1.5 μ M to about 3.0 μ M.
11. The method of claim 1, wherein the lactamase is in a range of about 1.5 μ M to about 20 μ M.
12. A method of identifying a nucleic acid ligand to a lactamase, comprising:
 - (a) preparing a candidate mixture of nucleic acids;
 - (b) contacting the candidate mixture of nucleic acids with the lactamase enzyme, to form an candidate-enzyme mixture;
 - (c) heating the candidate-enzyme mixture to a predetermined temperature, wherein a target nucleic acids have an increased affinity to the lactamase relative to the candidate mixture at the predetermined temperature whereby the target nucleic acids may be partitioned from the remainder of the candidate mixture;
 - (d) partitioning the nucleic acid ligand from the remainder of the candidate mixture; and
 - (e) amplifying the target nucleic acid to yield a pool of nucleic acids enriched with target nucleic acid sequences with relatively higher affinity and specificity for binding to the lactamase, whereby nucleic acid ligand of the lactamase may be identified.
13. The method of claim 12, further comprising:
 - (f) repeating steps (c), (d), and (e).

14. The method of claim 12, wherein the lactamase comprises a class B lactamase.
15. The method of claim 14, wherein the class B lactamase comprises a metallo- β -lactamase.
16. The method of claim 15, wherein the metallo-lactamase comprises a *B. cereus* 5/B/6 metallo- β -lactamase.
17. The method of claim 15, wherein the metallo-lactamase comprises a *B. cereus* 569/H/9 metallo- β -lactamase.
18. The method of claim 12, wherein said candidate mixture of nucleic acids comprises a single stranded nucleic acid.
19. The method of claim 18, wherein the single stranded nucleic acid comprises deoxyribonucleic acid.
20. The method of claim 12, wherein the salt concentration is in a range of about 10mM to about 50mM.
21. The method of claim 12, wherein the candidate mixture of nucleic acids is in a range of about 1.5 μ M to about 3.0 μ M.
22. The method of claim 12, wherein the lactamase is in a range of about 1.5 μ M to about 20 μ M.
23. A composition of matter comprising: a nucleic acid ligand to a lactamase.
24. The composition of claim 23, wherein the lactamase comprises a class B lactamase.
25. The composition of claim 24, wherein the class B lactamase comprises a metallo- β -lactamase.

26. The composition of claim 25, wherein the metallo-lactamase comprises a *B. cereus* 5/B/6 metallo- β -lactamase.
27. The composition of claim 25, wherein the metallo-lactamase comprises a *B. cereus* 569/H/9 metallo- β -lactamase.
28. The composition of claim 23, wherein said candidate mixture of nucleic acids is comprised of a single stranded nucleic acid.
29. The composition of claim 28, wherein the single stranded nucleic acid comprises deoxyribonucleic acid.
30. A composition of matter comprising: a nucleic acid ligand with affinity toward a lactamase.
31. The composition of claim 30, wherein the lactamase comprises a class B lactamase.
32. The composition of claim 31, wherein the class B lactamase comprises a metallo- β -lactamase.
33. The composition of claim 32, wherein the metallo-lactamase comprises a *B. cereus* 5/B/6 metallo- β -lactamase.
34. The composition of claim 32, wherein the metallo-lactamase comprises a *B. cereus* 569/H/9 metallo- β -lactamase.
35. The composition of claim 30, wherein the nucleic acid ligand comprises a single stranded nucleic acid.
36. The composition of claim 35, wherein the single stranded nucleic acid comprises deoxyribonucleic acid.
37. A composition of matter comprising a nucleic acid ligand with SEQID# 4.

38. The composition of claim 37, wherein the nucleic acid ligand inhibits a lactamase.
39. The composition of claim 38, wherein the lactamase comprises a class B lactamase.
40. The composition of claim 39, wherein the class B lactamase comprises a metallo- β -lactamase.
41. The composition of claim 40, wherein the metallo-lactamase comprises a *B. cereus* 5/B/6 metallo- β -lactamase.
42. A composition of matter comprising a nucleic acid ligand with SEQID# 5.
43. The composition of claim 42, wherein the nucleic acid ligand inhibits a lactamase.
44. The composition of claim 43, wherein the lactamase comprises a class B lactamase.
45. The composition of claim 44, wherein the class B lactamase comprises a metallo- β -lactamase.
46. The composition of claim 45, wherein the metallo-lactamase comprises a *B. cereus* 5/B/6 metallo- β -lactamase.
47. A composition of matter comprising a nucleic acid ligand with SEQID# 6.

The entire content of each of the following patents and publications are hereby incorporated by reference herein.

U.S. PATENT DOCUMENTS

US Patent 5,637,459 entitled "Systematic Evolution of Ligands by Exponential Enrichment: Chimeric Selex" issued on June 30, 1998 with Burke et al., listed as inventors.

US Patent 5,773,598 entitled "Systematic Evolution of Ligands by Exponential Enrichment: Chimeric Selex" issued on June 30, 1998 with Burke et al., listed as inventors.

REFERENCES CITED

Abraham, E. P. and Waley, S. G. (1979) " β -Lactamases from *Bacillus cereus*", in *Beta-Lactamases* (Hamilton-Miller, J. M. T. and Smith, J. T., eds.) pp. 311-338, Academic Press, New York.

Alberts, I. L., Katalin, N. and Wodak, S. J. (1998), "Analysis of Zinc Binding Sites in Protein Crystal Structures", *Protein Science* 7, 1700-1716.

Allawi, H. T. and SantaLucia, J. Jr. (1997), "Thermodynamics and NMR of Internal G-T Mismatches in DNA", *Biochemistry* 36, 10581-10594.

Ambler, R. P. (1980), "The Structure of β -Lactamases", *Phil. Trans. R. Soc. Lond.* B289, 321-331

Ambler, R. P., Coulson, A. F. W., Frere, J. -M., Ghuysen, J. -M., Joris, B., Forsman, M., Levesque, R. C., Triaby, G. and Waley, S. G. "A Standard Numbering Scheme for the Class A β -Lactamases", (1991) *Biochem J.* 276, 269-270.

Ambler, R. P., Daniel, M., Fleming, J., Hermoso, J. -M., Pang, C. and Waley, S. G. (1985), "The Amino Acid Sequence of the Zinc-Requiring β -Lactamase II from the bacterium *Bacillus cereus*", *FEBS Lett.* 189, 207-211.

Ausubel, F. M., Brent, R., Kingston, R. E., Moore, D. D., Seidman, J. G., Smith, J. A. and Struhl, K. (1992), "Introduction of Plasmid DNA into Cells", in *Short Protocols in Molecular Biology* pp. 26-27, Greene Publishing Associates and Wiley-Interscience, John Wiley & Sons, New York.

- Bartel, D. P. and Szostak, J. W., (1993), "Isolation New Ribozymes from a Large Pool of Random Sequences", *Science* 261, 1411-1418.
- Bicknell, R., Schaeffer, A., Waley, S. G. and Auld, D. S. (1986), "Changes in the Coordination Geometry of the Active-Site Metal During Catalysis of Benzylpenicillin Hydrolysis by *Bacillus cereus* β -Lactamase II", *Biochemistry* 25, 7208-7215.
- Brenner, D. G. and Knowles, J. D., (1984), "Penicillanic Acid Sulfone: Nature of Irreversible Inactivation of RTEM β -Lactamase from *Escherichia coli*", *Biochemistry* 23, 5834-5846.
- Bock, L. C., Griffin, L. C., Latham, J. A., Verma, E. H. and Toole, J. J. (1992), "Selection of Single-Stranded DNA Molecules that bind and Inhibit Human Thrombin", *Nature* 355, 564-566.
- Bouagu, S., Laws, A., Galleni, M. and Page, M. (1998), "The mechanism of Catalysis and the Inhibition of the *Bacillus cereus* Zinc-Dependent β -lactamase", *Biochem. J.* 331, 703-711.
- Carfi, A., Pares, S., Duee, E., Galleni, M., Duez, C., Frere, J. M. and Dideberg, O. (1995), "The 3-D Structure of a Zinc Metallo- β -lactamase from *Bacillus cereus* Reveals a New Type of Protein Fold", *The EMBO Journal*, 14, No. 20, 4914-4921.
- Chen, H. and Gold, L., (1994), "Selection of High-Affinity RNA Ligands to Reverse Transcriptase", *Biochemistry* 33, 8746-8756.
- Concha, N. O., Janson, C. A., Rowling, P., Pearson, S., Cheever, C. A., Clarke, B. P., Lewis, C., Galleni, M., Frere, J. M., Payne, D. J., Bateson, J. H. and Abdel-Meguid, S. S. (2000), "Crystal of the IMP-1 Metallo- β -Lactamase from *Pseudomonas aeruginosa* and its Complex with a Mercaptocarboxylate Inhibitor", *Biochemistry* 15, 4288-4298.
- Concha, N. O., Rasmussen, B. A., Bush, K. and Herzberg, O. (1996), "Crystal Structure of the Wide-Spectrum Binuclear Zinc β -Lactamase from *Bacteriodes fragilis*", *Structure* 4, 823-836.

- Crompton, B., Jago, M., Crawford, K., Newton, G. G. F. and Abraham, E. P. (1962), "Behaviour of Some Derivatives of 7-Aminocephalosporanic Acid as Substrates, Inhibitors and Inducers of Penicillanases", *Biochem J.* 83, 52-63.
- Danziger, L. H. and Pendland, S. L. (1995), "Bacterial Resistance to β -Lactam Antibiotics", *Am. J. health Syst. Pharm* 52 (Suppl 2), S3-8.
- Davies, R. B. and Abraham, E. P. (1974), "Metal Cofactor Requirements of β -Lactamase II", *Biochem J.* 143, 129-135.
- Davies, R. B. Abraham, E. P. and Melling, J. (1974), "Separation, Purification and Properties of β -Lactamase I and β -Lactamase II from *Bacillus cereus* 569/H/9", *Biochem J.* 143, 115-127.
- Davies, R. B. Abraham, E. P. Melling, J. and Pollock, M. R. (1975), "Comparison of β -lactamase II from *Bacillus cereus* 569/H/9 with a β -Lactamase from *Bacillus cereus* 5/B/6", *Biochem J.* 145, 409-411.
- Ellington A.D. and Szostak J. W. (1990), "In Vitro Selection of RNA Molecules that Bind Specific Ligands", *Nature* 346, 818-822.
- Farmulok, M. and Szostak, J. W. (1992), "In Vitro Selection of Specific Ligand Binding Nucleic Acids", *Angew. Chem. Int. Ed. Engl.* 31, 979-988.
- Felici, A. and Amicosante, G. (1995), "Kinetic Analysis of Extension of Substrate Specificity with *Xanthomonas maltophilia*, *Aeromonas hydrophilia* and *Bacillus cereus* Metallo- β -Lactamases", *Antimicrob. Agents Chemother.* 39, 192-199.
- Felici, A., Amicosante, G., Oratore, A., Strom, R., Ledent, P., Joris, B., Fanuel, L. and Frere, J. -M. (1993), "An Overview of the Kinetic Parameters of Class B β -Lactamases", *Biochem J.* 291, 151-155.
- Felici, A., Perilli, M., Franceschini, N., Rossolini, G. M., Galleni, M., Frere, J. -M., Oratore, A. and Amicosante, G. (1997), "Sensitivity of *Aeromonas hydrophilia* Carbapenemase to Δ^3 -Cephems", *Antimicrob. Agents Chemother.* 41, 866-868.

- Fisher, J., Charnas, R. L., Bradley, S. M. and Knowles, J. R. (1981), "Inactivation of the RTEM β -Lactamase from *Escherichia coli*", *Biochemistry* 20, 2726-2731.
- Folk, J. E. and Schirmer, E. W. (1963), "The Porcine Pancreatic Carboxypeptidase A System", *J. Biol. Chem.* 238, 3884-3894.
- Frere, J. M. (1995) *Mol. Microbiol.* 16 (3) " β -Lactamases and Bacterial Resistance to Antibiotics", 385-395.
- Ghuysen, J. -M. (1988) "Evolution of DD-Peptidases and β -Lactamases", in *Antibiotic Inhibition of Bacterial Cell surface Assembly and Function* (Actor, P., Daneo-Moore, L., Higgins, M. L., Salton, M. R. J. and Shockman, G. D., Ed.) pp. 268-284, American Society for Micro biology, Washington, D. C.
- Gold, L., Polisky, B., Uhlenbeck, O. and Yarus, M., (1995), Diversity of Oligonucleotide Functions", *Annu. Rev Biochem* 64, 763-797
- Hanahan, D. (1983), "Studies of Transformation of *Escherichia coli* with Plasmids", *J. Mol. Biol.* 166, 557-580.
- Hicke, B. J. and Stephens, A. W. (2000), "Escort Aptamers", *J. Clin. Invest.* 106, 923-928.
- Hilliard, N. P., (1995), Structure-Function Relationships in the Metallo- β -Lactamase of *Bacillus cereus* 5/B/6", Ph.D. thesis, Texas Tech University
- Hilliard, N. P. and Shaw, R. W. (1992), "Reconstitution of *Bacillus cereus* 5/B/6 Metallo- β -Lactamase Activity with Copper", *The FASEB J.* 6, p. A1008.
- Hussain, M., Pastor, F. I. J. and Lampen, J. O. (1987), "Cloning and Sequencing of the *blaZ* Gene Encoding β -Lactamase III, a Lipoprotein of *Bacillus cereus* 569/H", *J. Bacteriol.* 169, 579-586.
- Jaeger, J. A., Turner, D. H. and Zuker, M. (1989), "Improved Predictions of Secondary Structures for RNA", *Proc Natl. Acad. Sci. USA* 86, 7706-7710.
- Jaeger, J. A., Turner, D. H. and Zuker, M. (1990), "Predicting Optimal and Suboptimal Secondary Structure for RNA", *In Methods in Enzymology* 183, 281-306.

- Jellinek, D., Green, L. S., Bell, C. and Janjic, N. (1994), "Inhibition of Receptor Binding by High-Affinity RNA Ligands to Vascular Endothelial Growth Factor", *Biochemistry* 33, 10450-10456.
- Joris, B., Ledent, P., Dideberg, O., Fonze, E., Lamotte-Brasseur, J., Kelly, J. A., Ghuysen, J. - M. and Frere, J. -M. (1991), "Comparison of the Sequences of Class A Beta-Lactamases and of the Secondary Structure Elements of Penicillin-Recognizing Proteins", *Antimicrob. Agents Chemother.* 35, 2294-2301.
- Joyce, G. F. (1989), "Amplification, Mutation and Selection of Catalytic RNA", *Gene* 82, 83-87.
- Kelly, J. A., Knox, J. R., Moews, P. C., Moring, J. and Zhao, H. C. (1988), "Molecular Graphics: Studying β -Lactam Inhibition in Three Dimensions", in *Antibiotic Inhibition of Bacterial Cell surface Assembly and Function* (Actor, P., Daneo-Moore, L., Higgins, M. L., Salton, M. R. J. and Shockman, G. D., Ed.) pp. 261-267, American Society for Microbiology, Washington, D. C.
- Kogut, M., Pollock, M. R. and Tridgell, E. J. (1956), "Purification of Penicillin-Induced Penicillinase of *Bacillus cereus* NRRL 569", *Biochem. J.* 62, 391-401.
- Kuwabara, S., Adams, E. P. and Abraham, E. P. (1970), "Composition of β -lactamase I and β -Lactamase II from *Bacillus cereus* 569/H", *Biochem. J.* 118, 475-480.
- Kuwabara, S. and Lloyd, P. H. (1971), "Protein and Carbohydrate Moieties of a Preparation of β -Lactamase II", *Biochem. J.* 124, 215-220.
- Ledent, P., Raquet, X., Joris, B., Van Beeumen, J. and Frere, J. -M. (1993), "A Comparative Study of Class D Beta-Lactamases", *Biochem. J.* 292, 555-562.
- Lim, H. M., Pene, J. J. and Shaw, R. W. (1988), "Cloning, Nucleotide Sequence and Expression of the *Bacillus cereus* 5/B/6 β -Lactamase II Structural Gene" *J. Bacteriol.* 170, 2873-2878.
- Livermore, D. M. (1991), "Mechanisms of Resistance to β -Lactam Antibiotics", *Scand. J. Infect. Dis., Suppl.* 78, 7-16

- Lowry, O. H., Rosebrough, N. J., Farr, A. L. and Randall, R. J. (1951), "Protein Measurement with the Folin Phenol Reagent", *J. Biol. Chem* **193**, 265-275.
- Macaya, R. F., Waldron, J. A., Beutel, B. A., Gao, H., Joeston, M. E., Yang, M., Patel, R., Bertelsen, A. H. and Cook, A. G. (1995), "Structural and Functional Characterization of Potent Antithrombotic Oligonucleotides Possessing Both Quadruplex and Duplex Motifs", *Biochemistry* **34**, 4478-4492.
- Matagne, A., Ledent, P., Monnaie, D., Felici, A., Jamin, M., Raquet, X., Galleni, M., Klein, D., Francois, I. and Frere, J. M. (1995), "Kinetic Study of Interaction Between BRL 42715, β -Lactamases and D-Alanyl-D-Alanyl Peptidases", *Antimicrob. Agents Chemother* **39**, 227-231.
- Maugh, T. M. (1981), "A New Wave of Antibiotics Builds", *Science* **214**, 1225-1228.
- Maxam, A. M. and Gilbert, W. (1977), "A New Method for Sequencing DNA", *Proc. Natl. Acad. Sci. USA* **74**, 560-564.
- Meyers, J. L. and Shaw, R. W. (1989), "Production, Purification and Spectral Properties of Metal-Dependent β -Lactamases of *Bacillus cereus*", *Biochem. Biophys. Acta* **995**, 264-272.
- Mollard, C., Moali, C., Papamichael, C., Damblon, C., Vessilier, S., Amicosante, G., Schofield, C. J., Galleni, M., Frere, J. M. and Roberts, G. C. (2001), "Thiomandelic Acid, a Broad Spectrum Inhibitor of Zinc β -Lactamases", *J. Biol. Chem* **276** 45015-45023.
- Nagai, K. and Thogersen, H. C. (1984), "Generation of β -Globin by Sequence-Specific Proteolysis of a Hybrid Protein Produced in *Escherichia coli*", *Nature* **309**, 810-812.
- Neu, H. C. (1992), "The Crisis in Antibiotic Resistance", *Science* **257**, 1064-1073.
- Payne, D. J. (1993), "Metallo- β -lactamases-A New Therapeutic Challenge", *J. Med. Microbiol.* **39**, 993-999.

- Payne, D. J., Bateson, J. H., Gasson, B. C., Proctor, D., Khushi, T., Farmer, T. H., Tolson, D. A., Bell, D., Skett, P. W., Marshall, A. C., Reid, R., Ghosez, L., Combret, Y. and Marchand-Brynaert, J. (1997), "Inhibition of Metallo- β -Lactamases by a Series of Mercaptoacetic Acid Thiol Ester Derivatives", *Antimicrob. Agents Chemother.* 41, 135-140.
- Pitout, J. D. D., Sanders, C. C. and Sanders, W. E. (1997), "Antimicrobial Resistance with Focus on β -Lactam Resistance in Gram-negative Bacilli", *Am J. Med.* 103, 51-59.
- Rahil, J. and Pratt, R. F. (1991), "Phosphonate Monoester Inhibitors of Class A β -Lactamases", *Biochem J.* 275, 793-795.
- Rasmussen, B. A., Yang, Y., Jacobs, N. and Bush, K. (1994), "Contribution of Enzymatic Properties, Cell Permeability and Enzyme Expression to Microbial Activities of Beta-lactams in Three *Bacteroides fragilis* Isolates that Harbor a Metallo- β -Lactamase gene", *Antimicrob. Agents Chemother.* 38, 2116-2120.
- Reddy, P., Peterkofsky, A. and McKenney, K. (1989), "Hyperexpression and Purification of Escherichia coli Adenylate Cyclase Using a Vector Designed for Expression of Lethal Gene Products", *Nucleic Acids Res.* 17, 10473-10488.
- Robertson, D. L. and Joyce, G. F. (1990), "Selection *in vitro* of an RNA Enzyme that Specifically Cleaves Single-Stranded DNA", *Nature* 344, 467-468.
- Ruckman, J., Green, L. S., Beeson, J., Waugh, S., Gillette, W. L., Henninger, D. D., Claesson-Welsh, L. and Janjic, N. (1998), "2'-Fluoropyrimidine RNA-Based Aptamers to the 165-Amino Acid Form of Vascular Endothelial Growth Factor (VEGF₁₆₅), *Journal of Biological Chemistry* 273, 20556-20567.
- Sambrook, J., Fritsch, E. F. and Maniatis, T. (1989), "Electrophoretic Purification of Oligonucleotides", *Molecular Cloning: a laboratory manual*, 2ed, pp. 7.70, and 7.76, Cold Spring Harbor Laboratory Press, New York.
- Sabath, L. D. and Abarham, E. P. (1966), "Zinc as a Cofactor for Cephalosporinase from *Bacillus cereus* 569", *Biochem J.* 98, 11c-13c.

- Scrofani, S. D., Chung, J., Huntley, J. J., Benkovic, S. J., Wright, P. E. and Dyson, H. J. *Biochemistry* (1999), "NMR Characterization of the Metallo- β -Lactamase from *Bacteroides fragilis* and Its Interaction with a Tight-Binding Inhibitor", 44, 14507-14514.
- Shaw, R. W., Clark, S. D., Hilliard, N. P. and Harman, J. G. (1991), "Hyperexpression in *Escherichia coli*, Purification and Characterization of the Metallo- β -lactamase of *Bacillus cereus* 5/B/6", *Prot. Exp. Purif.* 2, 151-157.
- Suskoviae, B., Vajtner, Z. and Naumski, R. (1991), "Synthesis and Biological Activities of Some Peptidoglycan Monomer Derivatives", *Tetrahedron* 47, 8407-8416.
- Sutton, B. J., Artymiuk, P. J., Cordero-Borboa, A. E., Little, C., Philips, D. C. and Waley, S. G. (1987), "X-Ray Crystallographic Study of β -Lactamase II from *Bacillus cereus* at 0.35 nm Resolution", *Biochem. J.* 248, 181-188.
- Tasset, D. M., Kubik, M. F. and Steiner, W. (1997), "Oligonucleotide Inhibitors of Human Thrombin that Bind Distinct Epitopes", *J. Mol. Biol.* 272, 688-698.
- Thatcher, D. R. (1975), "Partial Amino Acid Sequence of the Extracellular β -Lactamase I of *Bacillus cereus* 569/H", *Biochem. J.* 147, 313-326.
- Tsiang, M., Gibbs, C. S., Griffin, L. C., Dunn, K. E. and Leung, L. K. (1995), "Selection of a Suppressor mutation That Restores Affinity of an Oligonucleotide Inhibitor for Thrombin Using *in Vitro* Genetics", *J. Biol. Chem.* 270, 19370-19376.
- Tuerk, C. and Gold, L. (1990), "Systematic Evolution of Ligands by Exponential Enrichment", *Science* 249, 505-510.
- Turner, D. H., Sugimoto, N. and Freier, S. M. (1988), "RNA Structure Prediction", *Annu. Rev. Biophys. Biophys. Chem.* 17, 167-192.
- Willis, M. C., Collins, B. D., Zhang, T., Green, L. S., Sebesta, D. P., Bell, C., Kellogg, E., Gill, S. C., Magallanez, A., Knauer, S., Bendele, R. A., Gill, P. S., Janjic, N. and Collins, B. (1998), "Liposome-Anchored Vascular Endothelial Growth Factor Aptamers", *Bioconjug. Chem.* 9, 573-582.

- Yang, K. W. and Crowder, M. W. (1999), "Inhibition Studies on the Metallo- β -lactamase from *Stenotrophomonas multipholia*", *Arch. Biochem. Biophys.* 368, 1-6.
- Zuber, M., Patterson, T. A. and Court, D. L. (1987), "Analysis of *nutR*, a Site Required for Transcriptional Antitermination in Phage λ ", *Proc. Natl. Acad. Sci. USA* 84, 4514-4518.
- Zuker, M. (1989), "On Finding All Suboptimal Foldings of an RNA Molecule" *Science* 244, 48-52.